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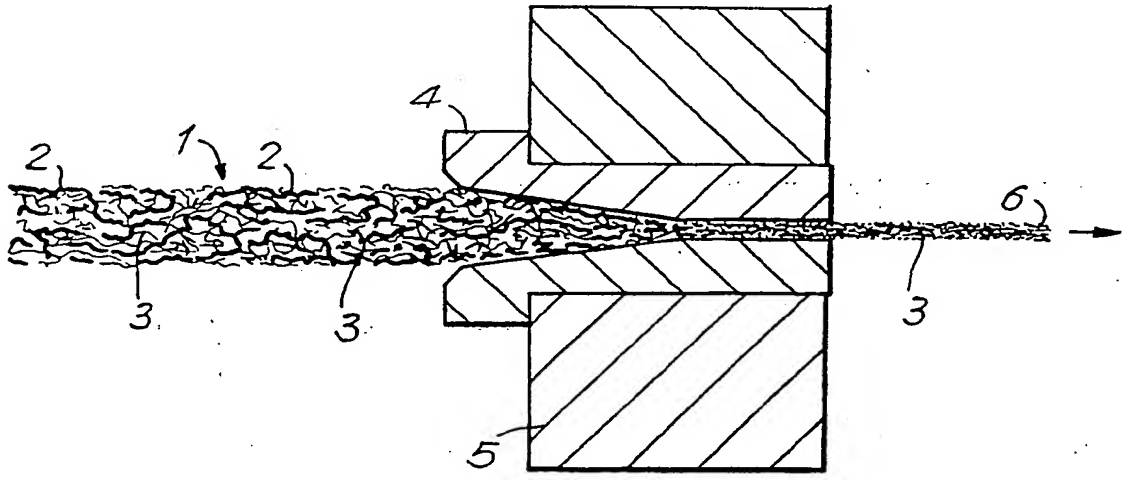
(54) Producing impregnated coated yarn

(57) A method for producing an impregnated, coated yarn structure 6, comprising drawing, through a heated die 5 having a tapering passage, a carded roving 1 containing two varieties of staple fibre, the varieties having different melting temperatures, in which the die is maintained at a temperature between the different melting temperatures. The lower-melting fibres melt, and completely impregnate and coat the higher-melting fibres. A variety of fibre material combinations are disclosed.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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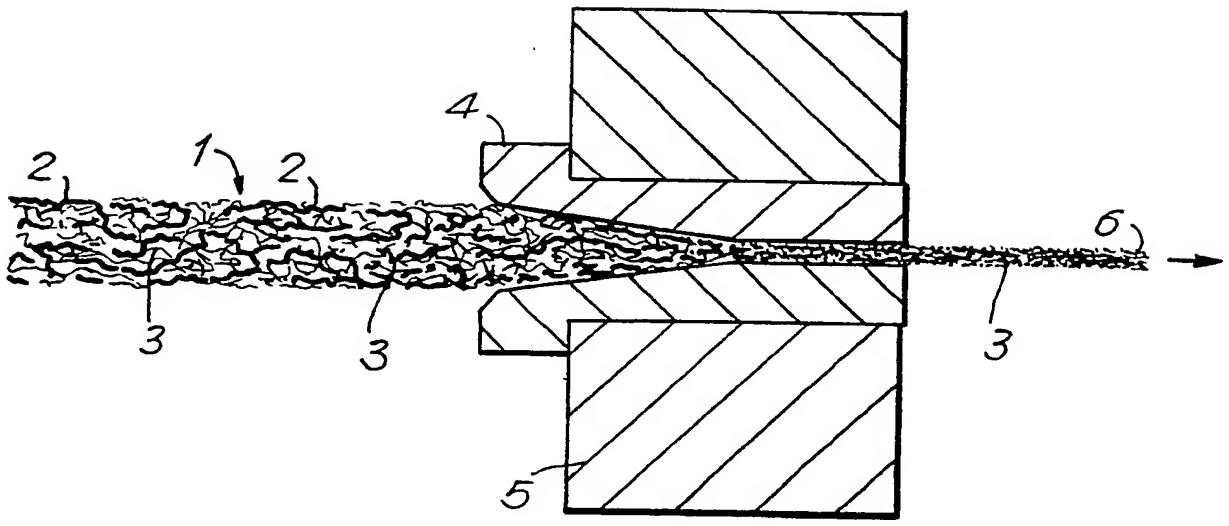

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METHOD FOR PRODUCING IMPREGNATED COATED YARN

This invention relates to yarns of the type which are used in the manufacture of absorbent clothing or felt for machines in the papermaking industry.

In processes conventionally used to coat yarns, it has proved difficult to ensure that the coating or encapsulating agent penetrates to the core of the yarn structure, because of the density of the individual fibres. As a result, impregnation is often incomplete, and some air remains trapped in the regions between these individual fibres. A yarn of less than optimum strength and integrity is often the outcome.

According to the present invention, a method for producing an impregnated, coated yarn structure, comprises drawing, through a heated die having a tapering passage, a carded roving containing two varieties of staple fibre, the varieties having different melting temperatures, in which the die is maintained at a temperature between the different melting temperatures.

The carded roving is preferably twisted to the desired degree of tightness before being passed through the heated die. The passage through the die gradually narrows or tapers in the direction of travel of the fibres being passed through.

The temperature of the die must be controlled so that only the fibres having the lower melting point will become fluid, and flow completely around those having the higher melting point. The die temperature must nevertheless be lower than that which would damage the fibres to be coated and encapsulated. The twist of the fibres of the unmelted component is not affected by the heat, and maintains the same degree of tightness. The taper of the die compresses the molten fluid and forces out any air bubbles present.

Once the structure exits from the die, the molten fluid solidifies as it is cooled by the ambient air. The resulting yarn has a structure of twisted staple fibres completely bonded by thermoplastic material and void of any trapped air bubbles.

The die is constructed of say, polytetrafluoroethylene, e.g. as marketed under the registered Trade Mark Teflon. A number of paired fibre combinations have been tried and found workable. In the following list, the first polymer of each combination has the lower melting temperature ("Nomex" and "Kevlar" are registered Trade Marks representing aramid and polypropylene, respectively):

nylon and polyester
nylon and Nomex
polyester and Nomex
nylon and Kevlar
polyester and Kevlar
nylon and acrylic
polyester and acrylic

The blend of fibres preferably comprises 25 to 75% by weight of the lower-melting point fibres. In practice, the proportion of low-melt to high-melt fibres is governed by the amount of fibre encapsulation required. In general, the higher the percentage of lower-melting fibre, the stiffer will be the resulting yarn. The method is therefore capable of being engineered to produce yarns having specific properties.

Products of the invention have desirable properties including strength, uniform structural integrity, and the total encapsulation of fibres within a thermoplastic coating.

The invention will now be described by way of example only with reference to the accompanying drawing. The drawing shows, on the left side, a carded roving 1 of

two staple fibres, low-melting fibres 2 and high-melting fibres 3, twisted together to a desired degree of tightness by suitable means (not shown). The twisted strand of carded roving 1 is drawn through a heated, compressing die 4, in the direction indicated by the arrow, by another suitable means (also not shown).

The die 4 is tapered and is positioned and fixed in a metal die retainer 5 which supplies the necessary heat to the die 4. Heat from the die 4 melts the fibres 2. In the course of passage through the die 4, the compression that arises from the taper in the die 4 forces the molten component 2 completely around the fibres 3. Air remaining in the spaces between the fibres 3 is forced out by the compressing action of the die 4. On the right side of the drawing, a strand of yarn 6 emerges from the die 4, made up of fibres 3 which have been coated and totally impregnated with a lower-melting component.

CLAIMS

1. A method for producing an impregnated, coated yarn structure, comprising drawing, through a heated die having a tapering passage, a carded roving containing two varieties of staple fibre, the varieties having different melting temperatures, in which the die is maintained at a temperature between the different melting temperatures.

2. A method according claim 1, comprising the additional step of twisting the carded roving containing the two varieties of staple fibre before drawing it through the heated die.

3. A method according to claim 1 or claim 2, wherein the staple fibres comprise 25 to 75% by weight of the variety of staple fibre having the lower melting temperature.

4. A method according to any of claims 1 to 3, wherein the two varieties of staple fibre are nylon and polyester.

5. A method according to any of claims 1 to 3, wherein the two varieties of staple fibre are nylon and aramid.

6. A method according to any of claims 1 to 3, wherein the two varieties of staple fibre are polyester and aramid.

7. A method according to any of claims 1 to 3, wherein the two varieties of staple fibre are polyester and polypropylene.

8. A method according to any of claims 1 to 3, wherein the two varieties of staple fibre are nylon and acrylic.

9. A method according to any of claims 1 to 3, wherein the two varieties of staple fibre are polyester and acrylic.

10. A method according to claim 1, substantially as herein described with reference to the accompanying drawing.

11. An impregnated, coated yarn produced by a method according to any preceding claim.

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